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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/998,114	11/29/2001	Karen E. Waldrup		4451

7590 09/08/2003  
Sandia National Laboratories  
P.O. Box 5800 - MS-0161  
Albuquerque, NM 87185-0161

EXAMINER
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NGUYEN, TUAN N

ART UNIT	PAPER NUMBER
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2828

DATE MAILED: 09/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/998,114

Applicant(s)

WALDRIP ET AL.

Examiner

Tuan N Nguyen

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.


- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- / 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

  
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## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11/29/2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4. 6) ☐ Other:

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite, vague, and confusing for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention, **for example**.

Claims 1, 13, and 14 recite a supported distributed Brag reflector comprising: a substrate, a *nucleation layer* on substrate; an interlayer on nucleation layer, comprising a material selected from AlN, Al<sub>x</sub>Ga<sub>1-x</sub>N and AlBN; and *multiple pairs of (Al,Ga,B)N/(Al,Ga,B)N layers* on said interlayer forming a distributed Bragg reflector. It is vague and indefinite as to the make up of the nucleation layer, and confusing as to what pairs of material it is claiming – a mixture of ALL of the elements (Al,Ga,B)N, or a ONE mix-match of the element (Al,Ga,B)N pairs in the interlayer; if it is a mixture of ALL of the element AlN, AlGa<sub>1-x</sub>N, and AlBN as a multiple pairs interlayers; the figures are objected because it does not shown the intended invention. Also, claim 13 recites “at least five pairs of Al<sub>y</sub>Ga<sub>1-y</sub>N/GaN layers”, it is not clear *the order structure* of these pairs layers. Claim 14, further recites “an interlayer comprising a material *selected form an* (Al,Ga,B)N material...; a layer of (Al,Ga,B)N material deposited on said interlayer”, it is vague and indefinite as to the differences of “*an interlayer* (Al,Ga,B)N and *a layer of* (Al,Ga,B)N”, (ex: AlN and AlN, or AlGa<sub>1-x</sub>N and AlGa<sub>1-x</sub>N is selected) ; also, “selected form an”

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should be corrected as “selected from an”, and “greater than *approximately*” is not a positive limitation. In re Hutchinson, 69 USPQ 138. Besides the preamble is being broad, there is insufficient structural and functional relationship to conform a distributed Bragg reflector, which render the claims vague and indefinite. Claims 2-12 are rejected base on the same reason.

It is believe that claim 4, is dependent on claim 1. If claim 4 is an independent claim, then claims 4-5 subject to restriction, because of different species.

***Claim Rejections - 35 USC § 102***

2. The following is a quotation of 35 U.S.C. 102(b) which forms the basis for all obviousness rejections set forth in this Office action:

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

3. Claims 1, 2, 3, 4, 8, 9, 11, 12 are rejected under 35 U.S.C. 102(a) as being unpatentable over Nunoue et al. (US 20020036295)(2000-289396).

Nunoue et al. '295 shows in figures 14,15a-g a support distributed Bragg reflector comprising: sapphire substrate, a nucleation layer GaN layer[section: 0110], interlayer of multiple pairs of AlGa<sub>N</sub> and Ga<sub>N</sub>, interlayer doped with silicon magnesium, having DB reflector greater than 99% [sections: 0096-0101] . It is inherent that the layers results from initial compressive growth stress – without compressing the layers together (intentionally by force, or unintentionally by gravity weight of material), the material layers cannot growth on top one another.

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4. Claims 1, 3, 4, 8, 12, are rejected under 35 U.S.C. 102(a) as being unpatentable over Koide et al. (US 2001/0048112) (US 6040588).

Koide et al. '112 shows in figure 1 a support distributed Bragg reflector comprising: a sapphire substrate, a nucleation GaN layer (Fig 1: 3), interlayer of AlGaIn and GaN (Fig 1: 5-8), and interlayer doped with Magnesium (F1: 7). It is inherent that the layers results from initial compressive growth stress – without compressing the layers together (intentionally by force, or unintentionally by gravity weight of material), the material layers cannot growth on top one another.

5. Claims 1, 3, 4, 8, are rejected under 35 U.S.C. 102(a) as being unpatentable over Khare et al. (US 6576932).

Khare et al. '932 shows in figures 1, 5, a support distributed Bragg reflector comprising: a substrate can be (sapphire, GaN, and others)(col 2: 6-65), a nucleation GaN layer, interlayer of AlGaIn and GaN, and interlayer doped with Indium (Col 5: 0-20).

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or non-obviousness.
7. Claims 5,6,7,10, 13, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nunoue et al. (US 20020036295)(2000-289396).

With respect to claims 5,6,7,10 Nunoue et al. '295 discloses the above, and further disclosed the multiple interlayer having 40 or more pairs [section 0101]. He also disclosed the interlayer thickness [section: 0096], ( $20\text{\AA}^0$  to  $1000\text{\AA}^0$  is equal to 2nm to 100nm); even though Nunoue '295 did not explicitly disclose the thickness of the nucleation layer, it inherently has a thickness. It has been held that discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

With respect to claims 13 and 14, Nunoue '295 disclosed the above, and shows in (figure 14: 117, 141) first and second five plus pairs of  $\text{Al}_y\text{Ga}_{1-y}\text{N}/\text{GaN}$  layers on top of first and second interlayer  $\text{Al}_x\text{Ga}_{1-x}\text{N}$  layers.

#### ***Citation of Pertinent References***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. It is cited primarily to show the product of the instant invention.

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Romano et al. (US 6285698), Ramdani et al. (US005838707A), Udagawa et al. (US006194744B1), Bowers et al. (US005985687A ), Kano et al. (US006566677B2)/ (US 20010035531), Taylor (US 20030123829A1), Nisitani et al. (US006229834B1), Kim (US006306672B1), Nisitani et al. (US006229834B1), and Dingle et al. (US 4205329)/ (US 4261771) disclose VCSEL or distributed Bragg reflector comprising: substrate, nucleation layer and interlayer AlGaN and GaN layers, that create a DB reflector.


***Communication Information***


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan N Nguyen whose telephone number is (703) 605-0756. The examiner can normally be reached on M-F: 7:30 - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Ip can be reached on (703) 308-3098. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-3329.

Tuan N. Nguyen



  
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